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RESURRECTED SPECIES OF *ERIGERON* (ASTERACEAE: ASTEREAE) FROM CENTRAL AMERICA

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ABSTRACT

Four species are resurrected from synonymy of the widespread *Erigeron karvinskianus* DC. The Costa Rican *E. irazuensis* Greenm. is known from the Cerros Escazú, Volcán Barva, and Volcán Irazú. The Costa Rican and Panamanian *E. maxonii* Blake is widespread in the Cordillera Talamanca, reaching as far south as Volcán Barú in Panama. These two species are similar to *E. karvinskianus*, which is native to Mexico and Central America but which also occurs widely as an adventive in subtropical regions of South America and other parts of the world. Two other related species, *E. pacayensis* Greenm., from Guatemala and western Honduras, and *E. aquarius* Standl. & Steyerm., endemic to Honduras, have rarely or never been recognized in previous treatments. A key, map, and descriptions distinguish these five Central American species. Along with the Mexican endemics *E. heteromorphus* B.L. Rob., *E. fluens* Nesom, and *E. barbarensis* Nesom & Van Devender, this set of species comprises *Erigeron* sect. *Karvinskia*.

KEY WORDS: *Erigeron karvinskianus*, *Erigeron irazuensis*, *Erigeron maxonii*, *Erigeron pacayensis*, *Erigeron aquarius*, Astereae, Central America

Erigeron karvinskianus DC. in Central America was treated broadly by D'Arcy (1975) and Nash (1976), but significant variation has escaped notice in such an inclusive view. This species, which probably occurs natively only in Mexico and Central America, and a group of lesser known close relatives have been recognized as *Erigeron* sect. *Karvinskia* Nesom (Nesom 1989, 2008), one of relatively few groups of *Erigeron* whose evolutionary radiation has been restricted to Mexico and Central America. Three of the species are endemic to Mexico: *E. heteromorphus* B.L. Rob., *E. fluens* Nesom, and *E. barbarensis* Nesom & Van Devender. The remaining five species of the section, including a new species described here, are restricted to Central America (Fig. 1).

Each of the four Central American endemics has a distinct morphology and a well-defined geographical range. Each differs from *Erigeron karvinskianus* in producing filiform ligules, a generally greater number of ray florets, and longer phyllaries. The resurrected species described here are distinctive in features of habit, vestiture, and leaf morphology. We provide a synopsis, with a key, descriptions, and map of the Central American species of *Erigeron* sect. *Karvinskia*.

Key to Central American species of *Erigeron* sect. *Karvinskia*

1. Stem vestiture spreading to deflexed.

    2. Stems arising from long (3–12 cm), fibrous-rooted, rhizomelike caudex branches; leaves attenuate to a narrow petiole region 1/3–1/2 the leaf length, not at all clasping, margins with 2–4 pairs of evenly spaced crenate-serrate teeth or shallow, acute lobes; rays not coiling; Volcán Irazú, Volcán Barva, and Cerros de Escazú in Costa Rica ..... **Erigeron irazuensis**
    2. Stems arising directly from a short rhizome; leaves basally attenuate but epetiolate, at least the mid-stem subclasping, margins entire or less commonly with 1–2 pairs of shallow serrations or acute lobes on the distal half; rays coiling; western to south-central Honduras ..... **Erigeron aquarius**

1. Stem vestiture antrorsely appressed to ascending.

    3. Leaves linear to linear-oblanceolate ..... **Erigeron pacayensis**
    3. Leaves elliptic to obovate or spatulate-obovate.

        4. At least the mid-stem leaves subclasping, margins commonly 2–4-toothed or -lobed; involucres 4.8–6.8 mm long; phyllaries purple-tinged, usually with a golden sheen, with prominently broad, scarious margins; rays filiform, 0.1–0.3 mm wide; disc corollas 3.3–4.5 mm long; achenes 1.5–1.9 mm long; Cordillera Talamanca in Costa Rica to Panama ..... **Erigeron maxonii**
        4. Leaves not at all clasping, margins 0–1(–2)-toothed or -lobed; involucres 2.5–5 mm long; phyllaries greenish-brown, dull, with narrow margins; rays broader, (0.5–)0.8–1.3 mm wide; disc corollas 2.3–3.3 mm long; achenes 1–1.4 mm long; Guatemala and Honduras, rare as adventive in Costa Rica ..... **Erigeron karvinskianus**

ERIGERON AQUARIUS Standley & Steyermark, Publ. Field Mus. Nat. Hist, Bot. Ser. 22: 301. 1940. **TYPE**: **Guatemala**. Depto. Sacatepéquez: slopes of Volcán de Agua, above Santa María de Jesús, 2250-3000 m alt., moist forest, 11 Feb 1939, *P.C. Standley 65053* (F digital image!).

Plants suffruticulose perennials from a short, slender, lignescent, fibrous-rooted rhizome. **Stems** 1-several from the base, erect, 15–50 cm tall, 2–6 branched from midstem or above, greenish, moderately hirsute-pilose with deflexed trichomes 0.2–0.6 mm long, eglandular. **Leaves** cauline, basal absent at flowering, tufts of small leaves rarely present in leaf axils, green, secondary venation often prominently visible, oblanceolate to elliptic-oblanceolate, 1.8–4 cm long, 2–8 mm wide, relatively even-sized along the stems, basally attenuate but epetiolate, subclasping, margins entire or less commonly with 1–2 pairs of shallow serrations or acute lobes on the distal 1/2, narrowly revolute or slightly thickened, ciliate with spreading hairs on the proximal half. **Heads** on peduncles 5.5–8 cm long; involucres 7–9 mm wide, 4.8–5.5 mm high; phyllaries in 3–4 subequal series or graduate and the outer half as long as the inner, lanceolate to narrowly elliptic-oblanceolate with acute to long acuminate apices, 0.3–0.4 mm wide, midrib golden-brown, midregion greenish-brown with brown lateral stramineous zones, sparsely strigose with thin-based trichomes not prominently flattened or twisted, sparsely to moderately minutely glandular; receptacles flat to shallow convex. **Ray florets** 80–180 in 1–2 series, corollas 6–8 mm long, white, drying white or purple-tinged, without a midstripe, nearly filiform, laminae 0.2–0.3 mm wide, coiling at maturity. **Disc florets**: corollas 3.4–4.5 mm long. **Achenes** ca 1.6 mm long, 2-nerved, sparsely strigose; pappus of 18–24 bristles, with a few outer setae 0.2–0.3 mm high.

Flowering at least Jul–Sep, probably longer. Meadows, thickets, pine-sweetgum forests; 1500–2000 m; western to south-central Honduras.

Additional collections examined. **HONDURAS. Depto. La Paz**: near Guajiquiro, 14° 07' N, 87° 50' W, secondary area, open forest, *Quercus*, *Pinus*, 1900–2000 m, 23 May 1993, *Liesner 26502* (MO). **Dept. Morazán**: Mt. Uyuca, 5500 ft, 3 Jul 1948, *Glassman 1861* (NY, UC); Cerro de Uyuca, along trail from Las Flores to La Labranza, moist meadow, 1600–1750 m, 17 Aug 1949, *Standley 22821* (GH); Cerro de Uyuca, trail between Las Flores and La Labranza, common in wet thicket, 1500–1575 m, 8 Sep 1949, *Standley 23498* (F, GH, NY, UC). **Dept. Ocotepeque**: El Moral on Cordillera Merendón, pine-*Liquidambar* forest, 1600 m, 27 Aug 1968, *Molina R. 22247* (NY).

Erigeron aquarius is characterized by erect stems single from the base and branching at midstem or above, arising from a fibrous-rooted rhizome, spreading-deflexed stem vestiture, cauline leaves mostly entire and even-sized, heads on long (5.5–8 cm) naked peduncles, granular-glandular phyllaries, long (3.4–4.5 mm) disc corollas, and filiform, coiling rays. The collections cited here are from three separated areas within Honduras.

ERIGERON IRAZUENSIS Greenman, Proc. Amer. Acad. Arts 40: 36. 1904. **LECTOTYPE** (Nesom & Boufford 1990): Costa Rica. Volcán Irazú, La Playita, endroits humides, 3300 m, 31 Jan 1900, *H. Pittier 14075* (GH! Figure 2; isolectotypes: "hb. Physico-Geogr. Cost. Ri. [CR?]," F digital image!, US! digital image!).

Plants herbaceous perennials, probably taprooted (taproots not collected), producing long (3–12 cm), fibrous-rooted, rhizomelike caudex branches. **Stems** erect to procumbent, 6–25 cm, 0–2-branched, greenish, sparsely to moderately or densely pilose with vitreous, irregularly spreading hairs 0.5–1.0 mm, sometimes deflexed on the proximal third of the stem, eglandular. **Leaves** cauline, basal mostly absent at flowering, clusters of axillary leaves absent, oblanceolate to spatulate-obovate, 2–4 cm long, 5–10 mm wide, relatively even-sized upward or the basal and lowermost slightly wider and more spatulate, attenuate to a narrow petiole region 1/3–1/2 the leaf length, not at all clasping, margins with 2–4 pairs of crenate-serrate teeth or shallow, acute lobes, apices indurate-mucronulate, margins flat or barely revolute, both surfaces moderately hirsute-pilose with erect-ascending hairs. **Heads** on peduncles 2–5 mm long; involucres 6(–7) mm high, 8–11 mm wide (pressed); phyllaries in 2(–3) subequal series, lanceolate with acute to acuminate apices, thin, greenish yellow to golden brown, inner wth purple tips and with 3 orange veins often prominent, margins scarious, sparsely hirsute-pilose with vitreous trichomes, eglandular. **Ray florets** 38–55 in 1–2 series, corollas 5–6 mm long, usually erect, white to pinkish, usually drying with purple tips or upper surfaces, without a midstripe, laminae filiform, 0.1–0.3 mm wide, not coiling. **Disc florets**: corollas 3.2–3.8 mm long. **Achenes** 1.3–1.5 mm long, 0.3–0.4 mm wide, 2-nerved, sparsely strigose; pappus of 18–22 bristles, with a conspicuous outer series of setae 0.3–0.6 mm high.

Flowering at least Feb–May, probably longer. Roadsides, roadbanks, disturbed sites, pastures; 2200–2800 m; central Costa Rica on at least the S, W, and N slopes of Volcán Barva (peak at 2906 m), Volcán Irazú (peak at 3753 m), and Cerros de Escazú (highest peaks are Cerro Rabo de Mico (2428 m), Cerro Cedral (2420 m), Cerro Pico Alto (2353 m), Cerro Pico Blanco (2271 m), and Cerro San Miguel (2035 m).

Specimens examined. **COSTA RICA. Prov. Cartago**: cratere de l'Irasu, RR, sur les roches de gris volcaniques, ca. 3300 m, 30 Mar 1888, *Pittier 152* (GH). **Prov. Heredia**: Cantón de Barva, Parque Nacional Braulio Carrillo, Cordillera Central, de Estación Barva a Finca La Georgiana, en area dentro del Parque, en pastos, 2200 m, 30 May 1993, *Fernández 1093* [basal leaves only] (MO); SW, W, and N slopes of Volcán Barva, along road from Sacramento to Colonia Jesús María,

disturbed roadside, 2650–2810 m, 29 Apr 1986, *Grayum 7505* (MO); Cordillera Central, N of Sacramento, bank by side of road, ca. 2500 m, 25 Feb 1984, *Khan et al. 1291* (MO); Parque Nacional Braulio Carrillo, 1 km al N de Sacramento, camino al Puesto Barva, 2300 m, 1 May 1990, *Rivera 248* (MO); Cantón de Barva, Cuenca del Tarcoles, 2 km de Sacramento, ruta al Volcan Barva, Parche de Bosque junto a la carretera, común en paredones a orilla del camino, 2500 m, 13 May 1997, *Rodríguez 2164* (MO). **Prov. San José**. Z.P. Cerros de Escazú, bosque secundario en la cima y falda norte del Alto Hierbabuena (Cerro Daser) en la vereda a la quebrada Suarez 7 Cucubres, 2300-2000 m, 3 Oct 1993, *Morales 1845* (TEX); Las Nubes, wet open banks, ca. 1500-1900 m, procumbent in dense masses, rays pink, common, 20-22 Mar 1924, *Standley 38406* (GH).

Erigeron irazuensis is distinct in its long (3–12 cm), fibrous-rooted, rhizomelike caudex branches, hirsute-pilose stems, and relatively short, oblanceolate to spatulate-obovate, conspicuously toothed to lobed leaves. Presumably it would be contrasted in identification with *E. maxonii*, which is its closest geographic neighbor. The northern terminus of the range of *E. maxonii* is in the Cordillera de Talamanca near the Savegre River basin, about 40 kilometers south of Volcán Irazú of the Central Cordillera and separated by the relatively lowland Cartago Valley.

Before it became clear that *Erigeron irazuensis* occupies a restricted geographical range, Nesom identified and annotated specimens in various herbaria as this, but those collections are identified here as *E. maxonii*.

ERIGERON KARVINSKIANUS DC., Prodr. 5: 285. 1836. **TYPE**: **Mexico**. Without definite locality or date, *Karvinsky s.n.* (M, not seen).

Erigeron mucronatus DC., Prodr. 5: 286. 1836. *Erigeron karvinskianus* DC. var. *mucronatus* (DC.) Aschers., Verh. Bot. Ver. Prov. Brandenb. Jahre 1899, 41: 37. 1900 [Ost. Bot. Zeit. 50: 22/23. 1900; a reference to the first publicaton]. *Erigeron karvinskianus* DC. var. *mucronatus* (DC.) Hiern., Bot. Jahrb. Syst. 28: 585. 1901, nom. illegit. comb. superfl. **TYPE**: **Mexico**. "Mexique," no other data (type material: G-DC, photo GH!, photo and fragment UC!).

Erigeron gaudichaudii DC., Prodr. 7: 274. 1838. **TYPE**: **Peru**. "In Peruvia ex herb. Gaudichaud."

Erigeron heterophyllus Kunth & Bouché, Ind. Sem. Hort. Berol., 11. 1845, nom. illegit. non. Muhl. ex Willd. (1803).

Erigeron leucanthemifolius Schauer, Linnaea 19: 723. 1847. **TYPE**: **Mexico**. "In Mexico," *Aschenborn 88*. "Proximus certo E. karwinskiano (DC. 5. 285. n. 11.), sed hirsutie diversus."

Vittadinia triloba Hort. ex J. Rudolph, Rev. Hort. 76: 315. 1904, non DC. (1836). Rudolph wrote the article ascribing the description (in French) to 'Hort.'

Felicia erigeroides sensu auct. non DC. (1836) (fide Raphael, Pap. Proc. Roy. Soc. Tasmania 89: 148. 1955).

Plants perennial, herbaceous to suffruticulose, roots woody, sometimes with an evident taproot, caudex usually simple, stems sometimes rooting adventitiously. **Stems** erect to sprawling or decumbent, 10–100 cm long, sparsely strigose to glabrate, eglandular, commonly producing tufts of small leaves in the axils of larger ones. **Leaves** basal and cauline, basal deciduous before flowering, cauline elliptic to obovate, not clasping, mostly 1–4(–5) cm x 5–13 mm, entire or with 1–2 pairs of acute, mucronulate teeth or shallow lobes on the distal margins, usually relatively even-sized along the stems, sparsely and loosely strigose to hirsute villous, eglandular. **Heads** 1–5, diffusely arranged, usually from long branches from above midstem on peduncles 2.5–13 cm long; involucres 2.5–4 mm high, 7–10 mm wide; phyllaries in 3–4 subequal to graduate series, often basally fused into a narrow ring, sparsely strigose to hirsute-villous or glabrate, eglandular to minutely glandular. **Ray florets** 45–80, 5–11 mm long, white, sometimes drying pinkish, laminae (0.5–)0.8–1.3 mm wide, not coiling

or slightly coiling. **Disc florets**: corollas 2–3.3 mm long. **Achenes** 1–1.4 mm, 2(–4)-nerved, sparsely strigose; pappus of 15–27 bristles, with a few outer setae 0.2–0.3 mm high. $2n = 18, 27, 36$.

Flowering all year but most abundantly in spring and summer (Mar–Sep). Moist to wet habitats, often rocky cliff faces or ravine slopes, various types of vegetation, often in areas of oak or pine, often in cut-over or second-growth areas. Probably native to Mexico and Central America; widely cultivated and naturalized in California (USA), Europe, Africa, India, east Asia, New Zealand, Hawaii, and a number of other Pacific islands. Plants at medium elevations in South America and the Greater and Lesser Antilles probably are non-native, at least in the sense that the species is not autochthonous there. The collection from Prov. San José, Costa Rica (cited below) probably documents an adventive.

Representative collections (Central America): **COSTA RICA**. **[Prov. San José**:] camino desde San Antonio–Escazú hasta Pico Blanco, 31 Aug 1983, *Gómez 20733* (MO). **EL SALVADOR**. **Depto. Santa Ana**: Cantón Potrero Grande arriba (Volcán de Santa Ana), 1600 m, 9 Jun 1989, *Martinez 279* (MO); Depto. Chalaltenango, Bosque de El Pital, 2000–2700 m, 5 Aug 1976, *Montalvo 4794* (MO). **GUATEMALA**. **Depto. Alta Verapaz**: Coban, 1350 m, Dec 1906, *von Turckheim 11721* (GH, MO). **Depto. El Quiche**: Nebaj, rocky hill ca. 4 km W, 6700 ft, 11 Jun 1964, *Contreras 4952* (LL). **Depto. Huehuetenango**: low hills along Rte 9N, ca 5 mi N of Huehuetenango, 17 Jul 1960, *King 3399* (TEX); San Juan Ixcoy, Captzin, orilla de la carretera, 3200 m, 15 Mar 2000, *Veliz et al. 7938* (MO). **Depto. Quezaltenango**: mountain along National Rte 9N, ca. 27 mi N of Quezaltenango, 16 Jul 1960, *King 3387* (TEX). **Depto. San Marcos**: 10 mi S of San Marcos along road from San Rafael, 2100 m, disturbed forest, 2100 m, 13 Jul 1977, *Croat 41020* (MO). **Depto. Santa Rosa**: Sabaneta, 6500 ft, May 1893, *Heyde & Lux 4518* (GH-2 sheets). **Depto. Sololá**: 15 km S of Panajachel, S of Lake Atitlan, 2200 m, 8 May 1972, *Burch 5916* (MO). **Depto. Totonicapán**: region of Chui-quisís, above T on road to Desconsuelo, pine-oak thicket, 2500-2800 m, 23 Jan 1941, *Standley 84384* (MO). **HONDURAS**. **Depto. Intibuca**: forest around Balneario Espanol of La Esperanza, 22 May 1970, Barkley & Hernandez R. 40330 (GH). **Depto. Fco. Morazán**: entre Santa Lucía y Valle de Angeles, bosque de nubes, floresta de Montana Grande, 1800 m, 26 Sep 1950, *Molina R. 3321* (GH); SW of San Juancito, bosque nebuloso de montaña, La Tigra, 2000 m, 14 Jul 1961, *Molina R. 10124* (GH, MO).

ERIGERON MAXONII S.F. Blake, Contr. U.S. Natl. Herb. 22: 594. 1924. **TYPE**: **Panama**. Eastern slope of Chiriquí Volcano, open brushy slopes, Cuesta Grande, 2600–2990 m, 11–13 Mar 1911, *W.R. Maxon 5306* (holotype: US! digital image!; isotypes: GH!, NY! digital image!, US!).

Erigeron chiriquensis Standley, Publ. Field Mus. Nat. Hist., Bot. Ser. 22: 126. 1940. **TYPE**: **Panama**. Prov. Chiriquí, Boquete District, Volcán de Chiriquí, Potrero Muleto, open areas, alt. 3140 m, 18 Jul 1938, *M.E. Davidson 872* (holotype: F digital image!; isotypes: GH!, MO!, US! digital image!).

Plants suffruticose perennials from a woody taproot. **Stems** usually several from the base, erect to procumbent, 17–45 cm tall, usually 1–5 branched, purple or reddish, sparsely strigose to hirsute-pilose with appressed to ascending or spreading hairs 0.1–1 mm long and often variable in orientation on a single stem, eglandular. **Leaves** cauline, basal absent at flowering, clusters of axillary leaves absent, spatulate-obovate, the lower 2.5–7.5 cm long, 5–12 mm wide, attenuate to a petiole region 1/3–1/2 the leaf length, with 2–4 pairs or serrate teeth or shallow, acute lobes on the distal 2/3, gradually reduced upwards and becoming lanceolate, epetiolate, subclasping, and more shallowly lobed to entire, apices indurate-mucronulate, margins very narrowly revolute and ciliate with ascending hairs. **Heads** on peduncles 5–55 mm long; involucres 5.2–6.8 mm high, 9–14 mm wide; phyllaries in 3–4 graduate series, outermost ca. 1/2 as long as the inner, lanceolate with acute to

acuminate apices, thin with 3 orange veins often prominent on the inner, inner wth purple tips, margins scarious and minutely lacerate-ciliate, sparsely strigose-pilose with flattened, vitreous, ascending trichomes 0.5–1.2 mm long, eglandular. **Ray florets** 40–115 in 1–2 series, corollas usually erect to ascending-erect, white to pinkish or dark red, usually drying with purple tips or upper surfaces, without a midstripe, laminae filiform, 0.1–0.3 mm wide, not coiling. **Disc florets**: corollas 3.3–4.5 mm long. **Achenes** 1.5–1.9 mm long, 0.4–0.5 mm wide, 2-nerved, sparsely strigose; pappus of 15–23 bristles, with a conspicuous outer series of setae 0.2–0.5 mm high.

Flowering all year except perhaps in late Sep–Nov. Rock faces, oak woods, thickets, or open areas of paramo; (1700–)2000–3820 m; central Costa Rica to western Panama (Volcán Barú).

Representative collections examined. **COSTA RICA. Prov. San José**: Cerro de la Muerte, 3300-3700 m, 20 Jun 1991, *Delprete 5081* (TEX); Cerro de la Muerte, 20 Apr 1947, *Fosberg 27305* (MO, NY); Cantón de Pérez Zeledón, Parque Nacional Chirripó, Cordillera de Talamanca, Valle Los Conejos, 3400 m, 27 Jul 1996, *Gamboa et al. 472* (MO); Cantón de Pérez Zeledón, P.N. Chirripó, 3400 m, 3 May 1997, *Gamboa R. 1305* (MO); La Muerte Massif, km 110 on Rte 2, 3000–3300 m, 18 Jan 1983, *Gómez 19715* (MO, TEX); Cerro de la Muerte, along Interamerican Hwy (Rt 2), SE of road to radio towers, roadside, 3200-3300 m, 2 Jan 1987, *Hill 17570* (GH); between KM 90-91 on Rte 2 between Cartago and San Isidro, 3400 m, 4 Jan 1988, *Holmes 4889* (TEX); Cerro del Muerte region, Cordillera de Talamanca, lower S slope of Cerro Zacatal[es], 3220 m, 21 Apr 1985, *Horn 162* (WIS); N side of Cerro de la Muerte, 3 Jan 1979, *Pruski 438* (TEX); summit on Cerro de la Muerte, 27 Aug 1967, *Raven 22073* (DS); Cantón de Dota, Los Santos, Cuenca del Savegre, 500 m de la Carretera Interamericana, entrando hacia San Gerardo, 2600 m, 17 Apr 1998, *Rodríguez et al. 3280* (MO); along Interamerican Hwy ca. 25 km SW of road to La Cima and 4.1 km NW of Cerro Asunción, 3180-3220 m, 11 Sep 1979, *Stevens 14273* (MO); Sierra de la Muerte, KM 88 S of San Jose on Interamerican Hwy., 8 Aug 1981, *Turner 15035* (TEX); KM 75 S of San Jose on Interamerican Hwy., 8 Aug 1981, *Turner 15040* (TEX); Chirripó massif, Pico Sureste, Dec 1966, *Weston 3610* (UC); S to SW of Cerro Chirripó, above Sabana, Rio Talari, 10 Dec 1966, *Weston 3691* (UC); Chirripo massif, Valle de los Lagos, 7 Sep 1969, *Weston 6065* (UC); Chirripó massif, Valle de los Conejos, 26 Jan 1976, *Weston 10078A* (UC). **Prov. Cartago-San José**: near Asunción at summit of the Interamerican Hwy, open paramo on exposed slopes and ridges, 3200 m, 15 Mar 1973, *Burger and Gentry 8534* (MO); edge of the paramo ca. 2 mi NW from La Asunción on the Carr. Interamericana, *Wilbur 17383* (DUKE, NY); 2.4 km NW of La Asunción on Interamerican Hwy., 7 Aug 1977, *Wilbur 24089* (CAS, DUKE); Cartago, base of Cerro Asunción, 15 Dec 1979, *Wilbur 28885* (CAS, DUKE, MO); Cartago, base of Cerro de la Muerte, Cordillera de Talamanca along Panamerican Hwy, 3200 m, 1 Feb 1965, *Williams et al. 28812* (GH, LL). **Prov. Limón**: Chirripó Natl. Park, paramo between Casa de Administración and peak, ca. 3400 m, 13 Feb 1983, *Garwood et al. 1175* (MO); Parque Nacional Chirripó, Del Puesto Los Crestones, 2.5 km al sur, camino a "La Sabana de los Leones," 3200 m, 29 Mar 1988, *Robles 1770* (MO). **PANAMA. Prov. Chiriquí**: summit and SW face of Cerro Copete, 9000 ft, 29 Jul 1947, *Allen 4884* (MO-2 sheets); Volcán Barú, above Yen Finca, Boquete District, 8000 ft, 17 Mar 1979, *Averett et al. 1060* (MO); Potrero Muleto vicinity, around upper rim, 18 May 1976, *Croat 34944* (MO); summit of El Barú, 3400 m, 13 Mar 1979, *D'Arcy and Hammel 12426* (MO); N side of Cerro Pavón on Paseo Respingo, 8400 ft, 4 Apr 1979, *D'Arcy et al. 12942* (MO); Volcán de Chiriquí, Dist. Boquete, open areas, 7000 ft, 11 Jul 1938, *Davidson 870* (GH); Volcán Barú, trail up from meadows between Volcan and Bambito, 1700–2100 m, 22 Jul 1985, *deNevers 6023* (MO); E side of Volcán Barú, 3000 m to summit, 24 Jul 1975, *Mori and Bolten 7436* (MO); vicinity of Boquete, Finca Collins, "El Velo," 6150 ft, 11 Mar 1963, *Stern et al. 1960* (MO); Volcán de Chiriquí, Potrero Muleto to summit, 13–15 Jul 1940, *Woodson & Schery 397* (GH, MO).

A variant expression of *Erigeron maxonii* occurs at 1100–2000 meters in the vicinity of Volcán Barú in western Panama. Typical *E. maxonii* occurs in the same immediate area, at the

southern end of its overall range, but generally at higher elevations, (1700–)2400–3400 meters. Like *E. maxonii*, the variants are short-lived perennials with ascending stems, appressed stem pubescence, and gold-colored phyllaries with broad scarious margins but the plants have linear-oblanceolate, non-clasping leaves and relatively smaller heads, florets, and achenes.

Specimens of the variant examined. **Prov. Chiriquí**: vicinity of Bambito, 30 May 1970, *Croat 10621* (MO-2 sheets); Boquete, 3800 ft, 13 May 1938, *Davidson 647* (GH, MO); Los Llanos, near Volcán, tussock field, ca. 2000 m, 3 Jun 1986, *McPherson 9270* (MO); Chiriquí Viejo Valley, 1 May 1938, *White 101* (GH, MO); vicinity of Boquete, 1200–1500 m, 24-26 Jul 1940, *Woodson & Schery 776* (GH-2sheets, MO).

Several collections from the same area are intermediate between the variant and typical *Erigeron maxonii*: **Prov. Chiriquí**: Loma Larga to summit, Volcan de Chiriquí, 2500-3380 m, 4-6 Jul 1938, *Woodson et al. 1051* (GH, MO, NY) and *Woodson et al. 1069* (GH, NY); Casita Alta to Cerro Copete, 2300–3300 m, 10 Jul 1940, *Woodson & Schery 363* (MO-2 sheets); Potrero Muleto to summit, Volcan de Chiriquí, 3500-4000 m, 13-15 Jul 1940, *Woodson & Schery 397* (GH). Plants of *Woodson & Schery 363* have larger heads of *E. maxonii* but narrow, entire to barely serrate cauline leaves. Those of other collections also have relatively large heads as well as pinnatifid to coarsely toothed, relatively broad leaves. Further study, especially in the field, may clarify the biological status of these variants.

ERIGERON PACAYENSIS Greenman, Publ. Field Columb. Mus., Bot. Ser. 2: 266. 1907. **LECTOTYPE** (Lowden, Taxon 19: 22. 1970): **Guatemala**. Dept. Amatitlán, crater of Volcán Pacaya, 8300 ft, 6 Jan 1907, 6 Jan 1907, *W.A. Kellerman 611* (F digital image!; isolectotypes: GH!, US! digital image!).

Erigeron deamii B.L. Rob., Proc. Amer. Acad Arts 45: 410. 1910. **TYPE**: **Guatemala**. Fiscal, growing under rocks in canyon, 3700 ft, 3 Jun 1909, *C.C. Deam 6159* (holotype: GH! photo ENCB!; isotype: MICH digital image!).

Erigeron tripartitus S.F. Blake, Brittonia 2: 337. 1937. **TYPE**: **Guatemala**. Dept. Suchitepequez, S slope of Volcán Atitlán, 7500 ft, decaying trunk at top of forested ridge, 14 Jan 1935, *A.F. Skutch 2124* (holotype: GH!; isotype: US! digital image!).

Plants suffruticulose perennials from a woody, usually horizontal, fibrous-rooted rhizome or from a taproot. **Stems** erect, 1-numerous, branching from near the base, 6–55 cm long, moderately to sparsely strigose with trichomes 0.2–0.8 mm long, eglandular. **Leaves** cauline, basal deciduous before flowering, linear to linear-oblanceolate, 1-nerved, 10–35(–65) mm long, 1–3(–6) mm wide, attenuate to a petiolar region, margins sometimes widely variable on a single plant, entire or with 1–2(–3) pairs of mucronulate-tipped teeth or linear lobes, often very narrowly revolute, not clasping, relatively even-sized along the stems, sparsely strigose above and beneath. **Heads** solitary on peduncles 2.8–4.8(–9) cm long; involucres 3.5–5 mm high, 6–10 mm wide; phyllaries in 3–4 subequal to graduate series or the outermost ca. half the length of the inner, inner 0.3–0.5 mm wide, often basally fused into a narrow ring, sparsely strigose, eglandular, tips sometimes purplish. **Ray florets** (50–)80–120 in 1–2 series, corollas 4–5 mm long, laminae 0.1–0.3 mm wide, white, maturing or drying pink to purplish, not coiling or reflexing at maturity, tube often hispid-pilose with sharp-pointed trichomes. **Disc florets**: corollas 2.3–3.3 mm long; style branches 0.3–0.5 mm long, including the shallowly triangular collecting appendages. **Achenes** 1.3–1.5 mm long, 0.3–0.4 mm wide, 2(–3)-nerved, sparsely strigose; pappus of 17–23 bristles, with a few outer setae 0.2–0.4 mm long.

Flowering (Apr–)Jun–Jul(–Dec) or all year. Roadsides, road cuts, usually in disturbed vegetation, oak-pine; 1000–2800 m; Guatemala to western El Salvador.

Representative collections examined. **EL_SALVADOR. Dept. Santa Ana**: Cerro Verde, camino a las brumas (ahora San Blas), 20 Mar 1993, *Montalvo 6251* (MO). **GUATEMALA. Dept. Amatitlán**: Volcan de Pacaya, 7 Apr 1921, *Tonduz 496* (MO). **Dept. Chichecastenango**: between Chichicastenango and Los Encuentros, 2050 m, 9 Jul 1991, *Stall 9* (TEX); Utitlán, 16 km from Chichecastenango, 19 Jun 1938, *von Schrenk s.n.* (MO). **Dept. Chimaltenango**: Hwy CA1 between turnoff to Patzún and Sololá, 14.8 mi NNW of turnoff of Patzún, 2480 m, 13 Feb 1987, *Croat and Hannon 64757* (MO); 7.6 km E of Patzún, 2000 m, 21 Jun 1970, *Harmon & Dwyer 2585* (MO); on CA1, 6.3 km W of Chimaltenango, 1925 m, 1 Jan 1992, *Prather 1038* (TEX); 24 mi W of Chimaltenango, W of Guatemala City, pine-oak, roadside cut, 8100 ft, 12 Aug 1975, *Wallace et al. 436* (MO). **Dept. El Quiche**: Joyabáj, 4500 ft, Apr 1890, *Heyde & Lux 4510* (MO); ca. 4 mi E of Sacapulas on Rte 7W toward Copan, pine woodland on steep slopes, 1825 m, 27 Dec 1991, *Soule 2974* (TEX). **Dept. Guatemala**: upper slopes of Vocan Pacaya just below cone on N side, 2200 m, 23 Aug 1970, *Harmon 4150* (NY). **Dept. Huehuetenango**: Canyon of Río Seligna, in "El Tapon" near Monos bridge, 40 km NW of Huehuetenango, 1000–1200 m, 14-17 Dec 1972, *Williams et al. 41157* (MO, NY). **Dept. Quetzaltenango**: ca 7 mi W of Quezaltenango on Natl. Rte 1, 2 Jul 1960, *King 3183* (TEX, NY); along road to Quetzaltenango, ca. 23 km S of Quetzaltenango, 4500 ft, 16 Jun 1976, *King 7024* (MO, NY); near Quezaltenango, 7500 ft, 1 Jul 1963, Nickerson s.n. (TEX); 4 km N of Santa Maria Planta Electrica on Hwy 9s, 2000 m, 31 Jul 1965, *Roe et al. 747* (MO). **Dept. Sacatepequez**: 2.3 mi SW of Alotenango on road from Antigua to Escuintla, 1300 m, 26 Jul 1977, *Croat 41965* (MO); 8.4 road km NE of Antigua Guatemal en route to Parramos, 1650 m, 1 Jan 1992, *Prather 1023* (TEX); Chillani, 1450 m, 3 Apr 1921, *Rojas 312* (MO); ca. 3 mi W of Cd. Vieja on rte. 3 toward Yepocapa, 25 Oct 1977, *Stuessy & Gardner 4365* (WIS). **Dept. San Marcos**: 15 km al E de San Marcos, bosque mesofilo, 11 Mar 1991, *Hernandez 2541* (TEX) and *2544* (TEX). **Dept. Sololá**: 3 mi above Panajachel on road to Patzicía around Lake Atitlán, 1750 m, 14 Jul 1977, *Croat 41065* (MO); ca. 20 mi E of Quetzaltenango on Rte. CA1, 2850 m, 2 Jan 1992, *Soule 3041* (MO, TEX). **Dept. Totonicapán**: ca. 10 km W of center of Totonicapán, 2400 m, 8 Apr 1986, *Gereau & Martin 1859* (MO); jct rte. CA-1 and road to San Franciso el Alto (ca. 1.8 mi N of San Cristobal Totonicapán), 24 Oct 1976, *Stuessy & Gardner 4333* (WIS). **HONDURAS. Depto. Morazán**: camino viejo entre Tegucigalpa y Suyapa, colinas pedregosa barro colorado, 1100 m, 6 Nov 1948, *Molina R. 1451* (GH).

All collections of *Erigeron pacayensis* except two apparently have all been from the western half of Guatemala (south of Petén). The collection from western El Salvador is from Cerro Verde, a relatively small volcano immediately southeast of Volcán de Santa Ana (Llamatepec), the highest volcano in the country (the peak is at 2381 meters). The collection from Depto. Morazon in Honduras is unambiguously identified but appears to be considerably disjunct.

Two collections have been studied that may reflect hybridization between *E. pacayensis* and *E. karvinskianus* in a region where they are sympatric: **Dept. Quetzaltenango**, ca. 7 mi W of Quetzaltenango, 2 Jul 1960, *King 3183* (TEX); **Dept. Solola**, mountains along National Rte 1, between Solola and Panajachal, 5 Jul 1960, *King 3224* (TEX). These plants have filiform rays but leaves broader than characteristic of *E. pacayensis*. The type of *Erigeron tripartitus*, from the same region, is a tall plant with leaves with deeply cut, narrowly lanceolate lobes and may also be such a hybrid. *King 3224* is a voucher for a hexaploid chromosome count of n = ca. 27 (Turner et al. 1960).

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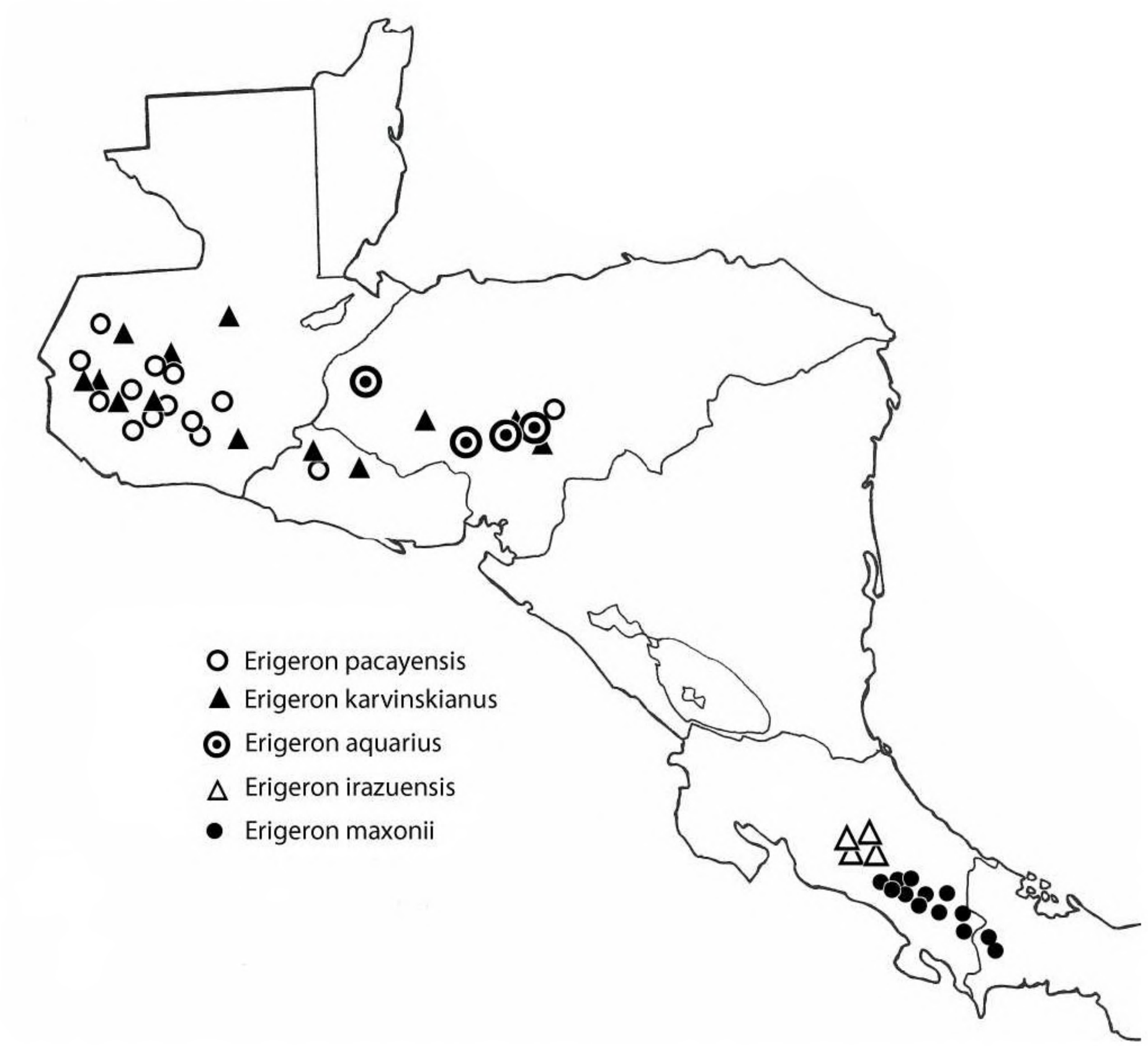

Figure 1. Distribution of species of the *Erigeron karvinskianus* group in Central America.

Figure 2. Holotype of *Erigeron irazuensis* (GH).